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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/478,370	02/16/2000	KIICHI HAMA	7363.0010	1598

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08/13/2003

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EXAMINER

ALEJANDRO MULERO, LUZ L

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 08/13/2003

27

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-27

Office Action Summary

Application No.

09/478,370

Applicant(s)

HAMA ET AL.

Examiner

Luz L. Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-87,92-122 and 124-167 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 37-63,85-87,92-119,138-165 and 167 is/are allowed.
- 6) ☒ Claim(s) 1-8,10-24,26-36,64-76, 78-84,120-122,124-126,128-137,164 and 166 is/are rejected.
- 7) ☒ Claim(s) 9,25,77 and 127 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 64-68, 70-71, 75, 79 and 164 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Yoder, U.S. Patent 5,225,366.

Tobin et al. shows the invention as claimed including an apparatus 210 for processing a substrate in a plasma, for example, in a deposition process (see col. 1- lines 34-35) comprising: a container; a dielectric window 204 supported by said container and dividing said container into a first container portion 90 and a second container portion 212; first exhaust means for creating a first vacuum in said first

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container portion; second vacuum means for creating a second vacuum in said second container portion; one of said first and second exhaust means including a vacuum pump; a controller 214 for controlling at least one of said first and second exhaust means or said vacuum pump in order to control a differential pressure across said window at a minimum value, the controller also controlling based upon a pressure in the first container; a table 96 arranged in said first container portion for supporting the substrate; a first supply 92 for supplying a process gas to said first container portion; a planar spiral coil 200 arranged in said second container portion; and a voltage supply (86,88) to said planar spiral coil 200 for generating an electromagnetic field whereby generation of said plasma is induced in said first container portion (see fig. 16 and col. 12-line 10 to col. 13-line 15).

Regarding a second supply for supplying an auxiliary gas to said second container portion, such a supply is inherent because gas must be present within the auxiliary chamber otherwise the exhaust means would not be necessary. Furthermore, note that fig. 16 shows that the diameters of the first and the second containers are substantially the same (claim 100).

Tobin et al. does not expressly disclose a controller for controlling the second exhaust means to control the pressure differential, wherein said second exhaust means is controllable according to an amount of the auxiliary gas supplied by said second supply to control the pressure differential across said window at the minimum value, and wherein said second exhaust means includes an exhaust pump controllable to control the pressure differential across said window at the minimum value. Yoder discloses an

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apparatus in which a programmable controller 34 is used to control the operation of exhaust pumps 50, 56, 38 and the exhaust means 52, 58, 40 (see fig. 1 and col. 6-line 50 to col. 8-line 46). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. so as to include a controller which is used to control the exhaust means and the exhaust pump in order to improve the efficiency and yield of the process being conducted within the apparatus and to maintain a preferred pressure range.

With respect claim 75, the examiner takes official notice that it is well known in the art to use a shower head as a gas supply means in order to uniformly distribute the gas(es). Concerning, claim 71, such a thickness would be optimized during routine experimentation based upon a variety of factors. For example, the dielectric window should be made thicker if a greater degree of pressure differential between the process and auxiliary chambers is required or thinner if a smaller difference between the chambers is required. Absent a showing of unexpected results, the particular thickness of the dielectric window would not render the instant application patentable.

Claims 120-121, 128-129, and 135 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Cuomo et al., U.S.

Patent 5,280,154.

Tobin et al. shows the invention as claimed including an apparatus 210 for processing a substrate in a plasma, for example, in a deposition process (see col. 1-lines 34-35) comprising: a container; a dielectric window 204 supported by said

container and dividing said container into a first container portion 90 and a second container portion 212; first exhaust means for creating a first vacuum in said first container portion; second vacuum means for creating a second vacuum in said second container portion; one of said first and second exhaust means including a vacuum pump; a controller 214 for controlling at least one of said first and second exhaust means or said vacuum pump in order to control a differential pressure across said window at a minimum value, the controller also controlling based upon a pressure in the first container; a table 96 arranged in said first container portion for supporting the substrate; a first supply 92 for supplying a process gas to said first container portion; a planar spiral coil 200 arranged in said second container portion; and a voltage supply (86,88) to said planar spiral coil 200 for generating an electromagnetic field whereby generation of said plasma is induced in said first container portion (see fig. 16 and col. 12-line 10 to col. 13-line 15).

Regarding a second supply for supplying an auxiliary gas to said second container portion, such a supply is inherent because gas must be present within the auxiliary chamber otherwise the exhaust means would not be necessary. Furthermore, note that fig. 16 shows that the diameters of the first and the second containers are substantially the same (claim 100).

Tobin et al. does not expressly disclose the container being formed of a conductive material, grounding means for grounding the container, and a lower electrode arranged in the work table and a power supply for applying a high frequency potential to the lower electrode. Cuomo et al. discloses a container substantially formed

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of a conductive material (see col. 4-lines 3-5), grounding means for grounding said container (see col. 4-lines 60-64), and a lower electrode arranged in the work table and a power supply for applying a high frequency potential to the lower electrode (see figure 1 and col. 4-lines 32-35). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. so as to include a container of conductive material, grounding means to ground the container, and a lower electrode in the work table with a power supply for applying a high frequency potential to the lower electrode because providing a lower electrode arranged in the work table and a high frequency potential increases attraction of the plasma to the work piece, thus increasing processing efficiency, forming the container of a conductive material is a suitable material, and grounding the container allows for the dissipation of the charged particles which reduces damage to the chamber sidewalls.

Claims 1-3, 5, 10-11, 17-19, 21, 26-27, 33-36, 69, 71-72, 78, 136-137, and 166 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Yoder, U.S. Patent 5,225,366, as applied to claims 64-68, 70-71, 75, 79, and 164 above, and further in view of Cuomo et al., U.S. Patent 5,280,154.

Tobin et al. and Yoder are applied as above but fail to expressly disclose the container being formed of a conductive material, grounding means for grounding the container, and a lower electrode arranged in the work table and a power supply for

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applying a high frequency potential to the lower electrode. Cuomo et al. discloses a container substantially formed of a conductive material (see col. 4-lines 3-5), grounding means for grounding said container (see col. 4-lines 60-64), and a lower electrode arranged in the work table and a power supply for applying a high frequency potential to the lower electrode (see figure 1 and col. 4-lines 32-35). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. modified by Yoder so as to include a container of conductive material, grounding means to ground the container, and a lower electrode in the work table with a power supply for applying a high frequency potential to the lower electrode because providing a lower electrode arranged in the work table and a high frequency potential increases attraction of the plasma to the work piece, thus increasing processing efficiency, forming the container of a conductive material is a suitable material, and grounding the container allows for the dissipation of the charged particles which reduces damage to the chamber sidewalls.

Claims 73-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Yoder, U.S. Patent 5,225,366, as applied to claims 64-68, 70-71, 75, 79, and 164 above, and further in view of Benzing et al., U.S. Patent 5,346,578.

Tobin et al. and Yoder are applied as above but fail to expressly disclose a cooler, for controlling the temperature of the coil, having a coolant flow passage.

Benzing et al. discloses a plasma apparatus in which cooling means 440,442,444,446

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are used to cool the coil (see figure 5 and col. 5-lines 17-23). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. modified by Yoder so as to include cooling means for cooling the coil as to maintain the temperature within a desired value.

Claim 76 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Yoder, U.S. Patent 5,225,366, as applied to claims 64-68, 70-71, 75, 79, and 164 above, and further in view of Ogle, U.S. Patent 4,948,458.

Tobin et al. and Yoder are applied as above but fail to expressly disclose a seat which supports the coil. Ogle discloses a plasma apparatus in which a coil 20 is supported by port 14 (see figures 1-2, and col. 5-lines 41-42). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. modified by Yoder to further comprise a seat on the dielectric plate in order to arrange and support the coil.

Claims 80-84 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Yoder, U.S. Patent 5,225,366, as applied to claims 64-68, 70-71, 75, 79, and 164 above, and further in view of Itoh, U.S. Patent 4,817,558.

Tobin et al. and Yoder are applied as above but fail to expressly disclose the claimed first and second gas supply members for supplying first and second gases,

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respectively. Itoh discloses an apparatus wherein different process gases are introduced into the processing chamber through two different gas introduction ports (a first gas supply port 5b and a second gas supply port 5a) for independently controlling the introduction of each gas to the processing chamber and the flow rate of each gas (see figure 1, col. 3, lines 58-66, and col. 5, lines 12-18 and 32-39). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. modified by Yoder as to comprise first and second gas introduction ports, as taught by the Itoh reference, as to independently control the introduction of the gases into the chamber and their respective flow rates. Official notice was previously taken that gas supply ports made of a dielectric material are commonly used in the art because of their good stability under high temperature environments. Since such official notice has not been challenged, this is taken to be admitted prior art.

Claims 4, 6-7, 20, 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Yoder, U.S. Patent 5,225,366 and further in view of Cuomo et al., U.S. Patent 5,280,154, as applied to claims 1-3, 5, 10-11, 17-19, 21, 26-27, 33-36, 69, 71-72, 78, 136-137, and 166, above, and further in view of Benzing et al., U.S. Patent 5,346,578.

Tobin et al., Yoder, and Cuomo et al. are applied as above but fail to expressly disclose a cooler, for controlling the temperature of the coil, having a coolant flow passage. Benzing et al. discloses a plasma apparatus in which cooling means

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440,442,444,446 are used to cool the coil (see figure 5 and col. 5-lines 17-23). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. modified by Yoder and Cuomo et al. so as to include cooling means for cooling the coil as to maintain the temperature within a desired value.

Claims 12-16 and 28-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Yoder, U.S. Patent 5,225,366, and further in view of Cuomo et al., U.S. Patent 5,280,154 as applied to claims 1-3, 5, 10-11, 17-19, 21, 26-27, 33-36, 69, 71-72, 78, 136-137, and 166, above, and further in view of Itoh, U.S. Patent 4,817,558.

Tobin et al., Yoder and Cuomo et al. are applied as above but fail to expressly disclose the claimed first and second gas supply members for supplying first and second gases, respectively. Itoh discloses an apparatus wherein different process gases are introduced into the processing chamber through two different gas introduction ports (a first gas supply port 5b and a second gas supply port 5a) for independently controlling the introduction of each gas to the processing chamber and the flow rate of each gas (see figure 1, col. 3, lines 58-66, and col. 5, lines 12-18 and 32-39). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. modified by Yoder and Cuomo et al. as to comprise first and second gas introduction ports, as taught by the Itoh reference, as to independently control the introduction of the gases into the

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chamber and their respective flow rates. Official notice was previously taken that gas supply ports made of a dielectric material are commonly used in the art because of their good stability under high temperature environments. Since such official notice has not been challenged, this is taken to be admitted prior art.

Claims 8 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Yoder, U.S. Patent 5,225,366 and further in view of Cuomo et al., U.S. Patent 5,280,154 as applied to claims 1-3, 5, 10-11, 17-19, 21, 26-27, 33-36, 69, 71-72, 78, 136-137, and 166, above, and further in view of Ogle, U.S. Patent 4,948,458.

Tobin et al., Yoder and Cuomo et al. are applied as above but fail to expressly disclose a seat which supports the coil. Ogle discloses a plasma apparatus in which a coil 20 is supported by port 14 (see figures 1-2, and col. 5-lines 41-42). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. modified by Yoder and Cuomo et al. to further comprise a seat on the dielectric plate in order to arrange and support the coil.

Claims 122, and 124-125 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Cuomo et al., U.S. Patent 5,280,154 as applied to claims 120-121, 128-129, and 135, above, and further in view of Benzing et al., U.S. Patent 5,346,578.

Tobin et al. and Cuomo et al. are applied as above but fail to expressly disclose a cooler, for controlling the temperature of the coil, having a coolant flow passage.

Benzing et al. discloses a plasma apparatus in which cooling means 440,442,444,446 are used to cool the coil (see figure 5 and col. 5-lines 17-23). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. modified by Cuomo et al. so as to include cooling means for cooling the coil as to maintain the temperature within a desired value.

Claim 126 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Cuomo et al., U.S. Patent 5,280,154 as applied to claims 120-121, 128-129, and 135, above, and further in view of Ogle, U.S. Patent 4,948,458.

Tobin et al. and Cuomo et al. are applied as above but fail to expressly disclose a seat which supports the coil. Ogle discloses a plasma apparatus in which a coil 20 is supported by port 14 (see figures 1-2, and col. 5-lines 41-42). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. modified by Cuomo et al. to further comprise a seat on the dielectric plate in order to arrange and support the coil.

Claims 130-134 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tobin et al., U.S. Patent 5,619,103 in view of Cuomo et al., U.S. Patent 5,280,154 as

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applied to claims 120-121, 128-129, and 135, above, and further in view of Itoh, U.S.

Patent 4,817,558.

Tobin et al. and Cuomo et al. are applied as above but fail to expressly disclose the claimed first and second gas supply members for supplying first and second gases, respectively. Itoh discloses an apparatus wherein different process gases are introduced into the processing chamber through two different gas introduction ports (a first gas supply port 5b and a second gas supply port 5a) for independently controlling the introduction of each gas to the processing chamber and the flow rate of each gas (see figure 1, col. 3, lines 58-66, and col. 5, lines 12-18 and 32-39). In view of this disclosure, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Tobin et al. modified by Cuomo et al. as to comprise first and second gas introduction ports, as taught by the Itoh reference, as to independently control the introduction of the gases into the chamber and their respective flow rates. Official notice was previously taken that gas supply ports made of a dielectric material are commonly used in the art because of their good stability under high temperature environments. Since such official notice has not been challenged, this is taken to be admitted prior art.

Allowable Subject Matter

Claims 9, 25, 77, and 127 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 37-63, 85-87, 92-119, 138-165 and 167 are allowed.

Response to Arguments

Applicant's arguments filed 5/21/03 have been fully considered and found persuasive with respect to claims 37-63, 85-87, 92-119, and 138-164. Therefore, the rejections of these claims have been withdrawn. However, applicant's arguments with respect to claims 1-36, 64-84, 120-122, 124-137, 164, and 166 have been fully considered but they are not persuasive.

With respect to applicant arguments that the Tobin reference does not suggest a second supply connected to the second container portion, comprising a gas supply pipe and a gas source for supplying an auxiliary gas to the second container portion, it should be noted that independent claims 1, 17, 64, 120, and 166, do not recite such limitation.

Applicant also argues that Tobin does not teach or suggest an inactive gas supplied to the auxiliary container portion, as claimed in claim 120. However, it should be noted that the air in the atmosphere can be considered to be the inactive gas which is supplied to the auxiliary container portion. Furthermore, it is noted that the claim, as broadly recited, does not require the presence of a gas supply **source** comprising an inactive gas.

Additionally, in response to applicant's argument that the Yoder reference neither discloses nor suggests controlling the exhaust to keep a pressure differential between a first container portion and a second container portion across a window at a minimum

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value, as recited in claims 64 and 100, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963). The apparatus of Tobin et al. modified by Yoder is capable of being controlled so that the exhaust keeps a pressure differential between a first container portion and a second container portion across a window at a minimum value.

Applicant further argues that the Cuomo, Benzing, Ogle and Itoh references do not supply the features of the invention missing from Tobin and therefore the combination of the references cannot suggest the claims under 35 USC 103(a). The examiner kindly disagrees for the reasons discussed above and respectfully contends that the combination of the references are proper and suggest the claimed invention as broadly recited.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

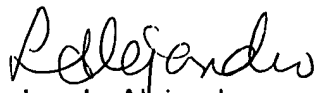
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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luz L. Alejandro whose telephone number is 703-305-4545. The examiner can normally be reached on Monday to Thursday from 7:30 to 6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.


Luz L. Alejandro
Primary Examiner
Art Unit 1763

August 8, 2003
